imager, and such that said specular highlight is displaced downward as each of said pendant drops increases in volume;

said computerized or electronic processing capable of converting said specular highlights in said images to a metric comprising pendant drop volume; and capable of thereby calculating flow rate in sub-drop increments.

11. A medical infusion device for delivering of fluids with controlled flow rate and volume into a patient's body, especially in environments where the presence of ferromagnetic material and the generation magnetic field related to such a device must be minimized, comprising:

a tube for carrying fluid from a proximal end to a distal end thereof under the action of a driving pressure, which is capable of being connected to a patient at said distal end;

said proximal end elevated above said distal end such that gravity applies a differential pressure across a length of said tube, causing fluid to flow through said tube from said proximal to said distal end;

omitting any magnetic motor pump for causing fluid to flow across said length of said tube;

omitting any non-magnetic motor pump for causing fluid to flow across said length of said tube;

a valve element at an intermediate point along said tube, capable of varying fluid flow by variably occluding a flow path through said tube, thereby variably controlling the rate of fluid flow;

a valve manipulating element capable of being variably moved relative to said valve element for causing said valve element to produce a variable occlusion of said tube;

at least one non-magnetic electrical motor for producing a mechanical output of variable movement and motive force;

a mechanical linkage between said motors and said valve manipulating element, for controllably moving said valve element by converting output motion of said at least one motor to motion of said valve manipulating element;

said mechanical linkage comprising a mechanical reducer for increasing the output motive force of said motors and decrease the velocity and displacement output of said motors to improve the resolution of movement of said valve element beyond the resolution achieved absent said mechanical reducer;

non-magnetic position sensing means, coupled to at least one of: said motors, said mechanical linkage, and said valve manipulating element, configured to provide feedback to a motor controller to allow controlled movement of said at least one non-magnetic electrical motor; and

for each of said non-magnetic electrical motors, two electrical transformers for increasing driving voltage, which transformers have a reduced size, reduced current capacity, and reduced output voltage, and which thereby generate reduced magnetic fields, in relation to transformers that would be required if a non-magnetic motor pump was not omitted; wherein:

said at least one non-magnetic electrical motor is configured to operate only when a change or correction of flow rate is required, thereby using less energy than would be used by a continuously-operating motor.

12. The device of claim **11**, said at least one non-magnetic electrical motor selected from the non-magnetic motor group consisting of: piezoelectric motors; and ultrasonic motors.

13. The device of claim **11**, further comprising a drip chamber and a flow rate monitoring system, said flow rate monitoring system comprising:

at least one optical imager directed toward areas and fluid flow features within said drip chamber;

at least one illuminator for directing illumination toward features within said drip chamber to which said optical imagers are directed;

a user interface, computerized or electronic processing, and non-transient computerized storage capable of performing processing and analysis operations and extracting feature information from digital images obtained by said optical imagers; and

said computerized or electronic processing further capable of analyzing and obtaining metrics from said feature information.

14. The device of claim **13**, said fluid flow features within said drip chamber selected from the fluid flow features group consisting of: fluid entering said drip chamber at a nozzle of said chamber during use; pendant fluid drops in area below said nozzle where pendant fluid drops form during use; and a fluid pool in lower section of said drip chamber formed during use.

15. The device of claim **13**, said metrics for said drip chamber selected from the metric group consisting of: drop rate; fluid pool depth; fluid type; pendant drop volume; error conditions; label data; and tag data.

16. The device of claim **13**, wherein growth of pendant drops is monitored as a means for measuring flow rate in sub-drop increments and further comprising:

said fluid flow features comprising pendant fluid drops in area below said nozzle where pendant fluid drops form during use;

said at least one optical imager and said at least one illuminator configured such that a distinct specular highlight appears in images obtained with said optical imager, and such that said specular highlight is displaced downward as each of said pendant drops increases in volume;

said computerized or electronic processing capable of converting said specular highlights in said images to a metric comprising pendant drop volume; and capable of thereby calculating flow rate in sub-drop increments.

17. A separable portion device of a medical infusion device for controlling the flow rate of a fluid into a patient's body, said separable portion device comprising:

a flexible tube having fluid connection fittings of standard type at proximal and distal ends;

an clamp enclosure containing a movable clamping element at an intermediate point along the length of said tube;

an opening in said enclosure through which a portion of said clamp element protrudes or is otherwise accessible, such that said clamp element may be actuated by a component of said device to variably occlude and thereby to control the rate of flow of fluid through said flexible tube;

a drip chamber at an intermediate point along the tube length and proximate to said clamp enclosure; and